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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CARIBBEAN ENVIRONMENTAL PROTECTION DIVISION
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NOV 20 2014

CERTIFIED MAIL/RETURN RECEIPT REQUESTED

Mr. Miguel García, P.E.
Environmental Manager
Allied Waste, Inc.
PO Box 51986
Toa Baja, PR 00950-1986

**RE: EPA Review Comments on Revised Alternate Source Demonstration and
Work Plan Related to Subtitle C Monitoring Wells GW-2, GW-8 & TW-1 Activities
BFI Municipal Landfill, Ponce, Puerto Rico
RCRA Post-Closure Permit No. PRD 980594709**

Dear Mr. García:

The United States Environmental Protection Agency ("EPA") has reviewed the April 24, 2014 revised Alternate Source Demonstration ("ASD") and the Work Plan related to the Subtitle C monitoring wells GW-2 and GW-8 and temporary monitoring well TW-1 activities. Enclosed please find EPA comments on both documents.

EPA has determined that the BFI-Ponce Landfill ("facility") has not met the ASD requirements set forth in the 40 C.F.R. Part 264.98(g)(6). The facility may continue its efforts to demonstrate an alternate source for statistically significant increases in thallium levels at well GW-8. In such case, the facility would need to resubmit a further revised ASD pursuant to the enclosed comments simultaneously with filing a Class 2 permit modification, as per 40 C.F.R. Part 264.98(g)(6)(iii), to make any appropriate changes to the detection monitoring program, including the replacement and/or development of any monitoring wells, as needed.

In addition, revise the Work Plan related to Subtitle C monitoring wells GW-1, GW-8, and TW-1 activities as per the enclosed comments. Please provide your response to EPA's comments on both documents within 30 days of the receipt of this letter.

Be reminded that if the facility is not able to demonstrate an alternate source as per 40 C.F.R. Part 264.98(g)(6) for the exceedances of thallium in GW-8, the requirements in 40 C.F.R. Part 264.99 to establish a compliance monitoring program will be effected. In such case, the facility will need to file a Class 3 permit modification application as per 40 C.F.R. Part 264.98(g)(4).

For additional information regarding this matter or any other issue related with BFI-Ponce's RCRA permit, please contact Angel E. Salgado of my staff at (787) 977-5854 or via email at salgado.angel@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jose C. Font".

Jose C. Font, Director
Caribbean Environmental Protection Division

Enclosures

cc: Lorna Rodriguez, PREQB

**TECHNICAL EVALUATION
OF APRIL 24, 2014 REVISED
ALTERNATE SOURCE DEMONSTRATION FOR THALLIUM
IN MONITORING WELL GW-8
PONCE MUNICIPAL LANDFILL
PONCE, PUERTO RICO
PRD980594709**

NOVEMBER 20, 2014

I. INTRODUCTION

The following is a technical review of the revised Alternate Source Demonstration (revised ASD) submitted in April 24, 2014 for the BFI-Ponce Municipal Landfill ("BFI-Ponce" or "Facility") in Ponce, Puerto Rico, in relation to thallium exceedances reported in Subtitle C monitoring well GW-8. The revised ASD was filed by the Facility's current operator, Allied Waste of Ponce, Inc. (AWIN). An ASD was initially submitted in September 4, 2012, but EPA determined that such demonstration was inadequate. In correspondence dated December 18, 2012, EPA required BFI-Ponce to provide a more robust, substantiated demonstration.

The revised ASD was submitted in an attempt to demonstrate that ongoing statistically significant increases in thallium observed in groundwater at monitoring well GW-8 can be attributed to an alternative source and not to hazardous wastes placed in the Ponce Municipal Landfill. In addition to the data and analysis presented in this revised ASD, further data collection and analyses are ongoing to better understand the complex hydrogeologic environment beneath the Ponce Municipal Landfill and to complete a new, holistic Groundwater Conceptual Model for the site. Such Conceptual Model, which is expected to be submitted in early 2015, is intended to support the revised ASD.

EPA's review of the revised ASD indicates that while it provides considerable additional data and analysis, the data and analysis currently presented are not sufficient to demonstrate that an alternate source is responsible for the thallium exceedances observed in GW-8. EPA has determined that the data and analysis presented in the revised ASD is not sufficient to warrant either the replacement of GW-8 or the movement of the compliance point some 1,660 feet to the southeast. The technical review has identified a number of concerns regarding the presentation and analysis of data in the revised ASD as well as the conclusions drawn from that data. These concerns are identified and discussed in the following General and Specific Comments. All references made in the following discussion to the ASD actually refer to the revised ASD, the one submitted in April 24, 2014, which is the subject of these review comments.

II. GENERAL COMMENTS

1. The ASD (Section 5.5, page 18) concludes that "the presence of methane and VOCs indicates the well may not be providing representative formation samples and that the increased metals may be

due to mobilization of natural metals in the rock from reducing conditions.” The ASD further concludes that “this supports the planned replacement/relocation of GW-8.”

This recommendation is made in spite of the result of the video survey of GW-8, which identified no structural issues in the monitoring well and indicated that GW-8 was in good condition. Moreover, no data or analysis has been provided in the ASD that convincingly demonstrates that GW-8 is not capable of providing representative formation samples. The data and analysis presented in the ASD does not clearly demonstrate that reducing conditions capable of mobilizing thallium are present in groundwater at GW-8 (see Specific Comment No. 5). The ASD also does not clearly identify the origin of the methane detected in the analysis of headspace samples from GW-8 (See Specific Comment No. 4); nor does the ASD indicate how the presence of landfill gases (primarily VOCs) in the headspace samples from GW-8 may affect groundwater quality at GW-8 and result in elevated levels of thallium in groundwater (see Specific Comment No. 7). Unless a clear impact of landfill gases in the vadose zone on groundwater quality is demonstrated, the mere presence of landfill gas in the vicinity of the point of compliance does not warrant the movement of the point of compliance. The ASD (page 16) also suggests that “suspected integrity issues” may be responsible for the large temperature fluctuation observed in groundwater at GW-8. However, the ASD fails to explore any potential causes for these fluctuations, including the potential impact of leachate from the landfill (see Specific Comment No. 12). Thus, the revised ASD provides no compelling justification for abandoning and replacing monitoring well GW-8.

2. The revised ASD (Section 5.1, page 17) has argued that “relocation of some point of compliance wells is needed due to landfill historical development” and that “the landfill has moved closer to (these) wells.” The topographic maps and cross-sections presented in the ASD are cited in support of this contention. However, it is not possible to discern the extent to which the landfill footprint has expanded with time using topographic maps and cross-sections provided in the ASD (see Specific Comment No. 17). BFI-Ponce should present a figure that clearly depicts the lateral extent of both the wastes placed in the landfill and the landfill footprint including the landfill berms for both 1990 and 2014.

Moreover, it is not clear what is meant by the ASD when it refers to the growth of the landfill footprint (Section 5.3, page 17). When discussing the expansion of the landfill in the vicinity of GW-3, the ASD references Figure 7, which depicts no apparent expansion of the lateral extent of the wastes placed in the landfill. Thus, any expansion of the landfill appears only to be the result of the lateral expansion of the landfill berm as a result of increasing the height of the landfill (see Specific Comment No. 12). The lateral expansion of the berms surrounding the landfill may require movement of monitoring wells due to physical damage to the wells or issues with accessibility. However, any such movement of compliance wells should be minimized since the point of compliance should be located as close to the wastes as possible to ensure prompt detection of hazardous constituents migrating from wastes placed in the landfill.

As stated above, the ASD does not presently support the replacement of GW-8 (see General Comment No. 1). Regardless, should GW-8 need to be replaced due to structural or other issues, the ASD does not support moving GW-8 approximately 1,660 feet to the southeast. To the extent the well replacement is necessary, the new well must be located close to the existing location in

order to monitor groundwater quality immediately downgradient from the waste placed in the landfill.

3. The ASD has provided no clear demonstration of an alternate source for the thallium exceedances detected in GW-8 other than to suggest there may be an issue regarding the structural integrity of GW-8 due to the detection of landfill gases in the headspace of GW-8 and to the observation of variable temperatures in GW-8 groundwater. However, the ASD provides no analysis demonstrating that these factors could affect thallium concentrations in groundwater at GW-8 (see General Comments No. 1 and 2).

Sampling of upgradient groundwater at GW-4 and GW-5 indicates that thallium is not present at significant concentrations in Ponce Formation groundwater (see Specific Comments No. 9, 10, & 11). Moreover, the ion distribution data depicted in the Piper plots presented in Figure 12 are limited but indicate significant temporal variability in anionic distribution. Of particular note are the observed distributions of anions in GW-8 which indicate much greater proportions of chloride ions in GW-8 than other Subtitle C wells. Chloride has been identified as a significant anion in landfill leachates, and the large amount of chloride observed in GW-8 suggests impact from landfill leachate at GW-8 (see Specific Comment No. 14).

While thallium has not been detected in landfill leachate, the location and nature of the single sample has not been discussed. Thus, the degree to which this single sample may fully represent leachate quality has not been established. Moreover, a more extensive sampling of leachate will likely be necessary to demonstrate the absence of thallium in leachate (see Specific Comments No. 1 and 8).

Unless it can be clearly demonstrated that an alternate source is responsible for the thallium exceedances observed at GW-8, the presumption will be that the source of the thallium is the landfill.

III. SPECIFIC COMMENTS

Section 2.4, Leachate Sample, Page 8

1. The description of leachate sampling should be expanded to discuss the location of the leachate sample and the portion of the landfill from which the sample is most likely derived. A general description of the leachate collection/detection systems should be provided so that the degree to which leachate samples represent leachate derived from discrete or more extensive portions of the landfill can be assessed. The general area where the Subtitle C wastes are thought to be located should be identified. The discussion should indicate whether the sample was taken from the leachate collection or detection system.

To help in assessing the potential for leakage past the hydraulic barriers created by the landfill liners, the discussion of the leachate collection and detection systems should also indicate the extent to which liquids (frequency and volume) are collected from these systems, particularly from

areas upgradient of GW-8. The past history of any Subtitle C and D groundwater monitoring that indicated potential leakage from the landfill should also be summarized.

Section 2.9, Groundwater Samples from GW-4 and GW-5, Page 9

2. The fourth sentence of this section reads "Characterization of groundwater in the Juana Diaz formation in the fault splay." This "sentence" is incomplete and the meaning unclear. Please revise as appropriate.
3. The text indicates that "GW-4 and GW-5 are located and screened in a perched aquifer within an alluvial unit that overlies the Juana Diaz formation." However, Cross-Section C-C' shown in Figure 7 indicates that GW-5 is screened in the Ponce Limestone. Cross-Section C-C' also indicates that GW-5 is in the fault between the Juana Diaz and Ponce Limestone Formations. These apparent discrepancies should be reconciled.

Section 4.1.3.1, Modified Natural Gas Analysis by ASTM D-1946, Page 11

4. Methane gas was detected at a very low level (0.0010%) in the headspace sample taken from GW-8. The report indicates that "because the GW-8 well screen is completely submerged in the groundwater, it is unlikely that landfill gas can enter the well through the screen interval." The report further concludes that the presence of methane gas in the head space of GW-8 "indicates there is an issue with the well integrity that is allowing gas to enter the well above the well screen."

This conclusion is unsupported. The low levels of methane gas observed in the headspace of GW-8 may well be the result of off-gassing from groundwater in the wells. Methane may dissolve in landfill leachate and migrate to the saturated zone where it migrates with groundwater. Methane may also be produced in groundwater in heavily reducing environments as the result of anaerobic degradation of organic contaminants.

BFI-Ponce should evaluate methane levels in groundwater at GW-8 to determine if the methane observed in headspace at GW-8 is due to off-gassing from groundwater rather than structural concerns with GW-8. Analysis of landfill leachate for methane may also be useful for determining the source of the methane observed in the GW-8 headspace sample.

5. The report (page 11) indicates that "field readings during well development confirm that water in GW-8 is reduced (although) dissolved oxygen (DO) values were in the range of 3.82 to 0.36 mg/L, and ORP values were ranging 64 to 55 mV." As acknowledged by this statement, these DO and ORP values are not indicative of a highly reducing environment. However, the cited field readings have not been presented and discussed. To support the contention that groundwater is reduced, the field readings should be presented and discussed. The extent to which reducing conditions exists that support either the generation of methane or the mobilization of arsenic and thallium should be fully evaluated.

Section 4.1.3.2, Volatile Organic Compounds by Modified TO-15 Full Scan Samples, Page 11

6. The report references Table 4 for the Eurofins TO-15 Air Sampling Results. Table 4 indicates that a headspace sample was taken on 1/18/2012. This appears to be an error and likely should read 10/18/2012. Please correct this error as appropriate. If the data is correct as presented, please discuss the comparability of the VOC and SVOC measurements with those taken from the landfill header.
7. The text concludes that the observation of VOCs and SVOCs common to landfill gas in the headspace sample from GW-8 “further supports that landfill gas is entering the well via an integrity issue above the well screen, affecting the ability of the well to provide representative samples of formation water, and possibly leading to an alternate source for the affected metals (mobilization of natural metals by creating reducing conditions).”

While the VOC's observed in the headspace space may suggest that soil vapor from the unsaturated zone is entering the well bore, it is not clear how this would affect the ability of the well to provide representative samples of formation water. In particular, it is unclear how this may result in an alternative source for the affected metals through the mobilization of natural metals by creating reducing conditions. Reducing conditions have not, as yet, been clearly demonstrated in groundwater at GW-8 (see Specific Comment No. 5). More importantly, it does not appear likely that the minimal amount of gas constituents that may partition from headspace gas into the groundwater in GW-8 would be sufficient to create reducing conditions in groundwater surrounding the well.

The report concludes that the presence of VOCs and SVOCs in the headspace sample from GW-8 supports the proposed plan to replace/relocate well GW-8. However, without further analysis justifying such a conclusion, the presence of landfill gases in GW-8 headspace samples does not provide sufficient justification for replacing GW-8. Moreover, the presence of such gases provides no obvious justification for moving GW-8 some 1,660 feet to the southeast.

Section 4.1.4 Leachate Sample Results, Page 12

8. The text indicates that the landfill leachate sample was non-detect for thallium. The text further concludes, “this supports that a leachate release was not the source of the increased thallium observed at GW-8.” As indicated in Specific Comment No. 1, it is unclear how representative the leachate sample collected on October 16, 2012 is of potential releases from the landfill areas upgradient from GW-8. Until the information requested in Specific Comment No. 1 is provided, it is not possible to determine what conclusions can be drawn from the October 16 leachate sample results. Regardless, it is unlikely that a single leachate sample will be sufficient to conclude that the thallium detected at GW-8 is not the result of a release from the landfill.

Section 4.1.6, Juana Diaz & Ponce Outcrop Sample Results, Page 12

9. The text (page 13) indicates that the presence of thallium identified in the Ponce Formation sample confirms that thallium observed in GW-8 could be from the natural rock formation. Many other factors, including geochemical conditions, are responsible for controlling the dissolution of metal constituents present in rock into groundwater. Thus, the presence of thallium in the Ponce Formation sample does not necessarily indicate that thallium will be present in groundwater. The

currently available groundwater quality data from GW-4 and GW-5, as well as from the non-potable water source, appear to indicate that conditions are not favorable for thallium dissolving into groundwater.

Section 4.1.8, Groundwater Samples from GW-4 and GW-5, Page 13

10. Analysis of groundwater samples collected from GW-4 and GW-5 showed no thallium at GW-4 and unquantifiable trace amounts at GW-5. Thus, thallium does not appear to be present in the groundwater from the Ponce Formation in the area immediately to the south at GW-4 and further to the south in the perched aquifer at GW-5. Although a clear hydraulic connection between these areas and GW-8 due to the perched water conditions and faulting has not been established, these data suggest that thallium is not present in groundwater in the Ponce Formation in areas upgradient from GW-8.
11. The text indicates that “wells GW-4 and GW-5 were sampled to determine if (the) GW-8 thallium exceedance can be linked to surrounding wells.” The text further concludes that “the lack of thallium in the GW-4 and only estimated values of dissolved thallium on GW-5 sample demonstrates there is no significant migration of thallium occurring from GW-8 to the southwest.” However, as the potentiometric contours depicted on Figure 3 indicate, groundwater flow is to the northeast in the Ponce Formation in the area of GW-8, and groundwater flow is clearly not from GW-8 towards GW-4 and GW-5. The absence of significant levels of thallium at GW-4 and GW-5 only suggests that significant levels of thallium are not present in groundwater in the Ponce Formation upgradient from GW-8 and provide no information regarding the migration of thallium in groundwater downgradient from GW-8. Please revise the conclusions reached based on the analytical results from the groundwater samples taken at GW-4 and GW-5.

Section 4.2, Cross Sections, Page 14

12. When discussing the area surrounding GW-3 shown on Cross-Section C-C' (Figure 7), the text (page 15) states that “by 2003 the landfill expanded into this area, therefore the topography of this area was lowered approximately 100 feet to allow for the later expansion.” Please depict both the original and 2003 topography on Figure 7. It is also important to note that no waste appears to have been placed in the area adjacent to GW-3. Thus, any expansion of the landfill appears only to be the result of the lateral expansion of the landfill berm as a result of increasing the height of the landfill. Please clarify what is meant by expansion of the landfill (see General Comment No. 2).

Section 4.4, Temperature, Page 16

13. Variations in groundwater temperature have been observed in the Subtitle C monitoring wells. These temperature variations are depicted in Figure 11. As noted in the text and depicted in Figure 11, the observed temperature variations in GW-8 are much greater than in other Subtitle C monitoring wells. Although it acknowledges that the cause of the greater fluctuations in temperature in GW-8 is unknown, the revised ASD suggests that temperature fluctuations may possibly be “related to the suspected integrity issue” with GW-8.

No basis has been provided for suspecting that the as yet unconfirmed integrity issues with GW-8 (see General Comment No. 2) are responsible for the temperature fluctuations observed in that well. The revised ASD has failed to explore any potential causes for these fluctuations. BFI-Ponce should consider the impact of leachate from the landfill as a potential cause for these temperature variations. The biochemical degradation occurring in the landfill is likely to raise the temperature of liquids in the landfill. Should any of these liquids be released to the subsurface, downgradient groundwater temperatures may be impacted.

Based on the data and analysis presented in the revised ASD, there is no basis for assuming that the integrity of GW-8 is responsible for the temperature variations observed in groundwater in that well.

Section 4.5, Piper Plots, Page 16

14. The similarity in historical Piper plots shown in Figure 12 is cited as evidence that site groundwater quality has not changed significantly over time. The text indicates that the plot was updated to include 1990 to present data. However, the data shown for the Subtitle C wells appears to be limited to data collected during 2012 or later. Data from non-Subtitle C wells that are apparently taken from a USGS database are also shown. The date and relevance of these additional data is not evident. Further, it is not clear if these USGS data are the 1990 data being referenced in the text. Please provide further clarification regarding the origin, date, and relevance of the data depicted on Figure 12.

It is also important to note that while the cationic makeup for individual Subtitle C wells is relatively stable, the distribution of anions is highly variable. The temporal variability of anion concentrations for GW-2 relative to other Subtitle C is particularly noteworthy, and suggests that this well may not be a suitable well for establishing background groundwater quality for the Subtitle C groundwater monitoring program.

It should be further noted that the anion distribution for GW-8 is highly biased towards chloride ions, unlike the other Subtitle C wells. Thus, the distribution of anions in GW-8 appears to be significantly different than that of other Subtitle C wells. Moreover, the anionic distribution of the leachate sample is heavily dominated by chloride ions, suggesting that landfill leachate may be impacting groundwater quality at GW-8.

Based on the above identified considerations, it does not appear appropriate to conclude “that the primary ion makeup of groundwater at the on-site wells has not changed significantly over time.” It also does not appear appropriate to conclude that the Piper plots support the opinion “that on-site groundwater quality has not been impacted by landfill activities and further supports the alternate sources discussed above for the increased trace metals.”

The discussion of the Piper plots should be expanded to provide a more complete analysis of the ion distributions observed on site. The impact of these distributions, including on the future designation of a background well and on the potential impact of landfill leachate on groundwater quality should be fully discussed.

Section 5.1 Monitoring Network, Page 17

15. The revised ASD concludes that GW-8 needs to be moved due to historical development of the landfill, including the presence of landfill gas in the headspace of GW-8 due to the close proximity of the landfill. However, the ASD has failed to demonstrate how the expansion of the landfill and the presence of landfill gas might impact the groundwater samples taken from GW-8 (see General Comments No. 1 and 2). Moreover, the ASD states that “a new location for this point of compliance well (GW-8) and one farther southeast of GW-5 are needed to evaluate the proposed Holistic Groundwater Conceptual model to be described in Section 6.0.” However, a holistic Groundwater Conceptual Model has not, as yet, been presented for the site. The development of such a conceptual model has been delayed pending further investigation (Section 6.0). While additional well(s) may be useful for further characterizing the groundwater flow regime downgradient of the landfill and developing a conceptual model for the site, BFI-Ponce has provided no justification for moving the compliance well GW-8 some 1,660 feet to the southeast of its current location. Without further justification, GW-8 will need to be retained at its current or nearby location as a compliance well (see General Comments No. 1, 2, & 3).

Section 5.2, Historical Piper and Stiff Plots, Page 17

16. When discussing the Piper and Stiff Plots, the revised ASD concludes that “recent Piper and Stiff plots remain consistent with previous results from the Golder RFA report.” However, as indicated in Specific Comment No. 14, it does not appear possible to conclude based on the Piper plots that groundwater quality, particularly the distribution of anions, has remained consistent with historical results.

The ASD further states that “Ponce Limestone formation water quality is representative of more pure carbonate rocks and the Juana Diaz Formation is typical of more impure limestone due to higher concentrations silt and clay leading to more dissolved metals in groundwater.” The ASD subsequently concludes that “these facts suggest that although groundwater potentiometric levels between the Ponce and Juana Diaz aquifers are getting closer, there is no marked mixing between these two including the plots for the GW-4 and GW-5 wells, within the alluvial deposits in the fault zone.” However, the data depicted in the Piper plots presented in Figure 12 and in the Stiff plots presented in Figure 13, do not appear to include any data from the Juana Diaz formation; nor are differences in the ionic distribution between the Ponce Limestone and Juana Diaz Formation discussed in the text of Sections 4.5 and 4.6. In addition, no groundwater quality data from GW-4 and GW-5 are presented in the Piper and Stiff plots discussed in Sections 4.5 and 4.6. Thus, it is not possible to draw any conclusions regarding the mixing of Ponce and Juana Diaz formation waters in GW-4 and GW-5 based on the data depicted on the Piper and Stiff Plots. The conclusions drawn from the Piper and Stiff Plots should be reconsidered and revised.

Section 5.3, Cross Sections, Page 17

17. The revised ASD concludes that “the cross sections and the recent site topographic map confirm that the landfill footprint has grown towards GW-2 and GW-8, therefore reassuring the need to relocate the wells to maintain an effective point of compliance.” However, the extent of the expansion of the landfill footprint is not readily apparent through comparison of the topographic

maps and cross-sections presented in the ASD. BFI-Ponce should present a figure that clearly depicts the lateral extent of both the wastes placed in the landfill and the landfill footprint including the landfill berms for both 1990 and 2014 (see General Comment No. 2).

In addition, it does not appear that the expansion of the footprint (i.e., the lateral extent of the landfill berms) justifies the movement of compliance wells beyond that necessary to maintain their structural integrity and provide accessibility (see General Comment No. 2). The discussion of, and conclusions drawn from, the cross sections regarding the expansion of the landfill and the movement of the point of compliance should be revised according.

18. The revised ASD further concludes that “point of compliance wells must be located within areas farther to the east and southeast of the landfill mass to avoid possible well integrity issues such as the landfill gas influence detected is GW-8.” However, no issues regarding the integrity of GW-8 have been identified in the ASD, and the presence of landfill gas in the vadose zone overlying groundwater at GW-8 has not been shown to be responsible for the exceedance of thallium detected at GW-8 or to impact the groundwater quality at GW-8 in any meaningful way (see General Comments No 1 and 2). BFI-Ponce should provide further justification for moving GW-8 or revise the conclusion regarding the necessity of moving GW-8.

Section 5.4, Soil Sampling Results, Page 17

19. The revised ASD concludes that “soil sampling results of the Ponce Formation samples presented detectable Thallium concentrations which support that the detections observed at GW-8 can be attributed to natural thallium in the formation.” While soil sampling confirmed the presence of thallium in soil samples from the Ponce formation, groundwater sampling from wells monitoring groundwater quality in the Ponce Formation has failed to detect significant amount of thallium in groundwater. Thus, soil sampling results do not appear sufficient to support a conclusion that thallium concentrations observed at GW-8 are attributable to natural thallium in the Ponce Formation. The conclusions regarding soil sampling results should be modified accordingly.

Section 5.5, Air Sampling Results, Page 18

20. The revised ASD concludes that “air sampling results confirmed the presence of volatiles (including methane) in the headspace of GW-8 which are typical of VOCs present in landfill gas.” The ASD further concludes that the detection of VOC and methane headspace in the of GW-8 indicates a possible integrity issue at GW-8 and that the presence of methane and VOCs indicates that the well may not be providing representative formation samples and that the increased metals may be due to mobilization of natural metals in the rock from reducing conditions. However, these conclusions remain largely unsupported and should be revised unless they can be substantiated (See General Comments No. 1 and 2).

Section 6.0, Recommendations

21. The revised ASD has recommended the modification of the Point of Compliance. This recommendation is based on GW-8 being “clearly closer to the waste mass” than 24 years ago. The ASD has concluded that GW-8 is now considered too close to the waste limits to provide

representative samples and ensure the integrity of the well. The ASD has also cited the influence from landfill gas and the high variability in groundwater temperature as evidence that the well integrity has been compromised. However, the lateral expansion of both the waste mass and the landfill berms over the past 24 years has not been clearly demonstrated (see General Comment No. 2). Moreover, video profiling of the GW-8 conducted as part of the ASD identified no issues with well integrity, and no adverse impact of landfill gas in the vadose zone has been demonstrated (see General Comment No. 1). While it may eventually become necessary to move GW-8 a limited distance due to structural issues related to encroachment of the landfill berm, it does not appear appropriate at this time to move the point of compliance a significant distance downgradient (see General Comment No. 2). The recommendations of the ASD should be revised accordingly.

22. The revised ASD has recommended the “relocation of GW-2 farther to the north than previously approved by EPA on February 19, 2014.” The basis for this relocation further to the north has not been provided in the ASD. The ASD should clearly justify the further relocation of GW-2 beyond referring to the well’s accessibility issues. The ASD has also indicated that GW-2 “will be included as the new background well for the Subtitle C area of the site,” and further indicates that “it has been shown in the stiff diagrams that groundwater geochemistry for this well has remained fairly constant for the past twenty four years and similar to the background values of the Ponce Formation aquifer versus GW-7, the present background well (as per the subtitle C Permit).” However, the Stiff diagram shown for 1990 in Figure 13 is unreadable and no conclusions can be drawn regarding the stability of groundwater quality in GW-2 based on the Stiff diagrams. It is important to note that Piper plots shown in Figure 12 indicate significant variability in the anionic distribution of groundwater from GW-2, indicating GW-2 may not be an appropriate background well (see Specific Comment No. 14). BFI-Ponce should reconsider the use of GW-2 as a background well.
23. The new holistic Groundwater Conceptual Model proposed to be submitted in January 2015 is expected to further support the Facility’s ASD for the thallium levels in GW-8. BFI-Ponce must further expand the scope and specifications of the proposed conceptual model. Such conceptual model proposal must incorporate EPA’s review comments on the Work Plan for GW-2 and GW-8 monitoring wells replacements, and TW-1 temporary well installation.

**TECHNICAL EVALUATION
OF APRIL 24, 2014 WORK PLAN
FOR GW-2, GW-8, AND TW-1 ACTIVITIES
PONCE MUNICIPAL LANDFILL
PONCE, PUERTO RICO
PRD980594709**

NOVEMBER 20, 2014

I. INTRODUCTION

The following is a review of the April 2014 Work Plan for proposed monitoring well activities at the Ponce Municipal Landfill facility in Ponce, Puerto Rico. As outlined in the Work Plan, wells GW-2 and GW-8 would be replaced and decommissioned, and temporary well TW-1 would be installed to expand the existing groundwater monitoring well network.

II. GENERAL COMMENTS

1. The Work Plan must be updated in order to account for the change in contractor for the proposed monitoring well activities. References to the appropriate contractor should be revised throughout the document. Likewise, the Work Plan's figures, tables and appendices must be revised and updated accordingly. All references made to the facility throughout the Work Plan should be consistent in order to avoid confusion.
2. The Work Plan includes procedures for decommissioning GW-8. Although movement of GW-8 has been recommended in the April 24, 2014 revised Alternative Source Demonstration (ASD) for GW-8, the replacement of GW-8 has not been approved and GW-8 remains part of the Subtitle C monitoring program until the permit is appropriately modified. Technical review of the revised ASD has identified concerns regarding the abandonment and movement of GW-8 to the location proposed in this Work Plan. As a result, GW-8 should not be abandoned and sealed at this time. However, the revised ASD indicates that the proposed location for GW-8R should provide important information for the development a Conceptual Model of Groundwater Flow for the site. EPA has no objections to the development and installation of a well for such purpose, but the well must not be referred to as GW-8R as it will not presently replace GW-8.
3. The Work Plan proposes the replacement of well GW-2 by GW-2R at a location much farther away from the original well than was originally planned. In fact, rather than being located within 10 feet of the original well as was approved by EPA on February 19, 2014, the replacement well is now planned for installation 150 feet north of GW-2's current location. Text at the top of page 3 indicates that this change is being proposed to "allow for ease of access and [well] maintenance." However, the Work Plan does not indicate how or to what extent the currently proposed relocation will impact the monitoring well network as a whole nor the data to be obtained. Although the originally planned relocation by 10 feet would not be expected to adversely affect the groundwater monitoring program, relocation by 150 feet has the potential to result in significant gaps in the well network. Expand the Work Plan to address this issue based on known groundwater flow directions

and the observed areas of groundwater contamination within the Ponce Formation, and further justify the proposed location extension of the GW-2 replacement well.

III. SPECIFIC COMMENTS

Section 1.3, Environmental Setting, Page 4

1. Revise the first sentence on page 4 of the Work Plan to delete the reference to monitoring well GW-6 as no such well exists to EPA's knowledge.

Section 1.4, Purpose and Scope, Page 5

2. Revise the first full sentence on page 5 to indicate that the proposed activities will be conducted as soon as the Work Plan is *reviewed* and approved by EPA.

Section 2.3, Decommissioning Activities, Page 8

3. There is a discrepancy between this section, which indicates that well abandonment will begin after reinstallation activities are complete, and Section 2.3.1, which indicates that well abandonment will occur after evaluation of October 2014 water quality data from the new wells. Revise the Work Plan to clarify that existing wells GW-2 and GW-8 will not be abandoned until EPA has reviewed water quality data from the replacement wells and has agreed that the original wells should be abandoned, as per Section I.2.2 of the Final RCRA Post-Closure Permit for this unit.

Section 2.3.1, Overdrilling, Page 8

4. This section indicates that the original well piping for both GW-2 and GW-8 will be demolished from the ground surface to a depth of 240 feet. However, each of these wells is roughly 261 feet deep, and EPA generally recommends that boreholes be sealed to within one foot of the bottom of the well. Clarify the Work Plan to indicate why the proposed abandonment procedure will not extend to the bottom of each well.

Section 2.9, Sample Collection and Classification, Page 11

5. This section of the Work Plan (and the associated Standard Operating Procedures (SOPs) in Appendices I and J) suggests that soil samples will be collected for laboratory analysis. However, the Work Plan does not specify the number of soil samples to be collected during drilling, the depth of proposed sampling (other than six inches below ground level), laboratory analytical parameters, or required quality assurance and quality control protocols. Rather, it appears that this section is intended to obtain lithologic information for each well boring. Clarify the scope of work proposed in this section of the Work Plan as specified above and include only those SOPs deemed relevant to current work.

Section 2.11, Investigation-Derived Wastes, Page 12

6. The last paragraph in this section indicates that disposal options for soil cuttings and wash waters will depend on whether those wastes contain contamination “at levels that would pose a concern.” This statement is overly vague. Instead, the Work Plan should refer to the hazardous waste characterization process, including specific sampling requirements and test methods.

Figure 3, April 2013 Potentiometric Surface Map

7. This figure is intended to show the location of existing wells that monitor the Ponce and Juana Diaz Formations at and around the Ponce Municipal Landfill. Revise this figure to correct the reference to well GW-5 as a water quality monitoring well for the Ponce Formation instead of for the Juana Diaz Formation.

Figure 4, Organizational Chart

8. Revise this figure to include the designated official at the Puerto Rico Environmental Quality Board.

Figure 5, Relocation Map for GW-2, GW-8 & TW-1

9. Revise this figure to show the location of proposed additional wells GW-2R and GW-8R (labeled otherwise) as referenced in the updated Work Plan. (Refer to General Comments 2 and 3 above)